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PLANETARY PHENOMENA FOR NOVEMBER AND DECEMBER, 1911.

By Malcolm McNeill.

PHASES OF THE MOON, PACIFIC TIME.

Full Moon ...	Nov. 6,	$7^h 48^m$ A.M.	Full Moon	Dec. 5,	$6^h 52^m$ P.M.
Last Quarter .	" 12,	11 19 P.M.	Last Quarter ..	" 12,	9 46 A.M.
New Moon...	" 20,	12 49 P.M.	New Moon....	" 20,	7 40 A.M.
First Quarter.	" 28,	5 42 P.M.	First Quarter..	" 28,	10 47 A.M.

The Sun reaches its greatest south declination at the winter solstice and winter begins December 22nd, 3 P. M. Pacific time.

Mercury is an evening star at the beginning of November, but is too near the Sun for twilight observation. By the end of the month it has moved far enough away to set about an hour after sunset and may possibly be seen under good weather conditions. The interval between the setting of the Sun and planet will remain an hour or a little more until after the middle of December. Greatest east elongation, 20° 59′, occurs on December 7th. This is rather less than the average, as the planet is in perihelion on December 22nd. After greatest elongation *Mercury* approaches the Sun very rapidly, passing inferior conjunction and becoming a morning star on December 25th. By the end of the month it rises rather more than an hour before sunrise.

Venus is a morning star and comes to its greatest west elongation on November 26th. Its apparent distance from the Sun is then 46° 45′, about 1° greater than its apparent distance from the Sun at greatest east elongation on July 7th, although its actual distance from the Sun is less by 600,000 miles. But at the same time the Earth is much nearer its perihelion and also to *Venus* in November than it was in July and this causes the November elongation to be the greater. The planet is also considerably north of the Sun, and the combination of these two causes makes the interval between the rising of the Sun and of the planet rather greater than usual. Throughout the whole two-months' period the planet rises at least three and one half hours before sunrise and about the time of greatest elongation not far from four hours before. At the same time the planet will not have lost greatly in brightness from the maximum of late October. *Venus* will move during the two months about 60° eastward and 18° southward from the eastern boundary of *Leo* through *Virgo* and into *Libra*.

Mars reaches opposition with the Sun on the evening of November 24th, and during the greater part of the two-months' period it is above the horizon almost all night. On November 1st it rises about an hour and one half after sunset and on December 1st it remains above the horizon until about three hours before sunrise. It is in the constellation *Taurus* and on November 1st is about 5° north of the first-magnitude star *Aldebaran*. Its motion until December 29th is about 15° nearly due westward, and on December 31st is just about 4° north of the position it occupied among the stars on August 22nd. On the evening of December 4th it is in close conjunction with the Moon and in some regions it will be occulted by that body. The time of nearest approach of *Mars* to the Earth is November 17th, a week before the time of opposition. This difference is due to the fact that *Mars* is moving away from its perihelion and consequently increasing his distance from the Sun, while the Earth is moving toward its perihelion and therefore diminishing its distance from the Sun. The result is that the two bodies are at their minimum distance from each other several days before they come into line with the Sun. The present opposition is about an average one in point of minimum distance between Earth and *Mars*. At this opposition the distance is somewhat more than 47,000,000 miles, 11,000,000 more than it was at the opposition of 1909, and about 13,000,000 less than the minimum possible. An opposition of this last kind will occur August 23d, 1924. At the most unfavorable opposition the distance is nearly 63,000,000 miles. The brightness of the planet will be about one half of that which it had at the opposition of 1909. This was a very favorable one, the brightness being 90% of the maximum possible. At the most unfavorable oppositions the brightness is only about one fifth of the maximum possible. By the end of December the brightness will have fallen off about 50%. The time between successive oppositions, the synodic period, varies about one and one-half months, principally owing to the eccentricity of *Mars's* orbit. Between the present opposition and that of 1909 is an interval of 791 days, while to the next following opposition the interval will be 773 days.

Jupiter is an evening star setting less than an hour after the Sun on November 1st. It passes conjunction on November 18th and becomes a morning star. By the end of December it rises not quite three hours before sunrise. It moves about 14° eastward and 3° southward from *Libra* into *Scorpio*.

Saturn is almost exactly opposite to *Jupiter* among the stars. It comes to opposition with the Sun on November 9th, and at that time will be above the horizon the entire night, and up to the end of December will not set before 3 A. M. It is on the border line between *Aries* and *Taurus*, and during the two months it moves about 3° westward and 1° southward. The rings present about the same appearance in the telescope as they have for some months.

Uranus is in the southwestern sky in the evening, setting shortly before 10 P. M. on November 1st and shortly after 6 P. M. on December 31st. It moves about 3° eastward into the constellation *Capricornus*. No bright stars are near.

Neptune rises shortly before 10 P. M. on November 1st and shortly before 6 P. M. on December 31st. It is moving slowly westward in *Gemini*.

(SEVENTIETH) AWARD OF THE DONOHOE COMET-MEDAL.

The Comet-Medal of the Astronomical Society of the Pacific has been awarded to Mr. C. C. KIESS, of the Lick Observatory, Mount Hamilton, California, for the discovery of an unexpected comet on July 6, 1911.

Committee on the Comet-Medal:

W. W. CAMPBELL,
S. D. TOWNLEY,
H. D. CURTIS.

SAN FRANCISCO, August 26, 1911.

(SEVENTY-FIRST) AWARD OF THE DONOHOE COMET-MEDAL.

The Comet-Medal of the Astronomical Society of the Pacific has been awarded to Dr. WILLIAM R. BROOKS, of the Smith Observatory, Geneva, N. Y., for the discovery of an unexpected comet on July 20, 1911.

Committee on the Comet-Medal:

W. W. CAMPBELL,
S. D. TOWNLEY,
H. D. CURTIS.

SAN FRANCISCO, August 26, 1911.